MEETING ANNOUNCEMENT AND PRELIMINARY AGENDA

Operations Group Accounting Methodology Meeting
Monday, November 13
10 am - 4 pm
Room 1131, The Resources Building

DISCUSSION PAPER

This discussion paper is designed to facilitate discussion on the various parts of the workshop agenda. The agenda topic is listed first, followed by discussion and/or hypotheses. These discussions represent possible starting points for the workshop discussion. Note that this discussion is tightly focussed on the issue of accounting. Another major question is whether the application of flexibility is likely to provide net benefits to the environment. That question will have to be left for other processes.

THE RULES GOVERNING OPS GROUP FLEXIBILITY

The Operations Coordinations Group is authorized to:

- Reduce exports when large number of fish are subject to salvage at the export facilities.
- Increase exports above the nominal limits when the damage caused by increased pumping is thought be low with the intent of compensating water exporters for any losses caused by pumping curtailments.
- Adjust exports to create a flow regime favorable to species even when the risks of salvage are low.

The Ops Group is to attempt to make up for losses in pumping resulting from take limits, even when the Ops Group did not order the export curtailments.

The Ops Group may authorize pre-pumping by the state and federal projects in order to generate environmental credits.

The Ops Group may authorize the use of a joint point of diversion (including pre-pumping) in order to provide fisheries benefits, provided that no yield is created thereby. Any credits must be repaid within 6 months.

The Ops Group cannot hold environmental credits in a way that reduces export supplies or export storage. (This principle seems to be necessary, but is not state explicitely in any document.)

Credit accounts are kept separately for the CVP and SWP.

DEVELOP GENERAL ACCOUNTING METHODOLOGY FOR OPS GROUP FLEXIBILITY

Discussion

If the Ops Group allows greater exports than the projects could have achieved without the Ops Group actions, then the projects owe water to the environment. If the Ops Group reduces exports below what they would otherwise have been, then the environment owes water to the projects.

This concept is captured in the following equations:

Daily Credit Equation

$$\Delta C_{acre\text{-}feet} = 2(\ Actual\ Pumping_{cfs} - Baseline\ Pumping_{cfs}\ ) \quad (1)$$

Net Credit Equation

$$C_{acre\text{-}feet} = 2\sum_{days}(Actual\ Pumping_{cfs} - Baseline\ pumping_{cfs}) \quad (2)$$

where:

ΔC	=	Change in environmental credit for any given day in acre-feet (positive or negative). The factor of two is based upon the relationship 1 cfs = 2 acre-feet per day. This equation is applied separately to the CVP and SWP.
C	=	Net Environmental Credit in acre-feet for an extended number of days. In order to satisfy the December 15 Accord and the SWRCB WQCP, C should sum to zero over some acceptable period of time if possible. That acceptable period is the lesser of (1) regulatory requirements (e.g., 6 months) or (2) the date at which a failure to pay back credits will cause harm to the other side (e.g., delay to pay back credits should not cause water shortages).
Actual pumping	=	Average pumping which actually takes place during the given day (actual pumping may vary from baseline pumping because of actions taken by the Ops Group).
Baseline pumping	=	Average pumping that would have taken place during the given day in the absence of a shift in exports. Baseline pumping is not the same as the physical capacity, but could vary for any number of reasons. For example:

- o Regulatory constrains. Projects may need to reduce pumping as a result of outflow standards, percentage of Delta inflow standards, or limitations on pumping during the April-May San Joaquin pulse flow
- o During dry periods, the projects may simply not be able to deliver enough water at the pumps to remain at full capacity.
- o During wet periods, reduced demand might force reduced pumping.
- o Once San Luis Reservoir is full, pumping may be reduced because there is no place to put the water.
- o Physical diversion capacity might differ during the year. For example, the federal capacity to export water is approximately 4600 cfs during the summer, but only 4200 cfs in winter.

- o Note that reductions in pumping as a result of ESA take limitations are not counted as part of the baseline (the language of the WQCP makes clear that reductions due to take limits create an environmental debt to exporters).

ESTIMATING CREDITS AND DEBITS PROSPECTIVELY -- RISK ANALYSIS

Discussion

When the Operations Group considers whether or not to increase exports (e.g., by recommending that exports be allowed to exceed the nominal export/inflow standard or recommending that the CVP be allowed to use the Banks pumping plant) or to decrease exports (by lowering the allowable export import ratio), it must deal with questions of risk. If exports are to be reduced, what is the risk that the water will not be made up in a timely manner and harm exporters. If the exports are to be increased, what is the risk that the increased pumping now will outweight reduced pumping later (this question is not dealt with in this workshop).

A real time accounting system capable of predicting (statistically) the implications of changes in export operations requires the following:

- o Rules about project operations (contracts, rule curves, flood control rules, environmental standards, etc.)
- o The proposed change in operational rules (e.g., changed exports). The proposed change could involve just the current proposal for changed pumping, or could also include future changes in pumping designed to provide payback.
- o Initial conditions.
- o A statistical picture of the future (runoff, demand, outflow requirements, etc.)

Then, through a monte carlo analysis, the value of equation (2) can be computed statistically. For example, an exceedence curve giving the value of C over a period of time could be given. A low risk operation for the projects would have a low probability that the value of C will less than zero for an appropriate time period (e.g., before San Luis reaches its low point in the summer).

This information provides information on the supply side about the risks of changed export operations. A similar analysis would be done for environmental risk (though the analysis may be based upon the expert judgement of biologists for now).

CALCULATING CREDITS AND DEBITS RETROSPECTIVELY

The actual impact of changed export patterns cannot be determined until after the fact. As in the case of prospective analysis, it requires knowledge of actual pumping and baseline pumping.

Retrospective analysis will be relatively straightforward in many cases because the actual pumping is always known in retrospect, while the baseline pumping will often be easy to reconstruct (e.g., in wet years operators will pump at max except as limited by storage). However, in cases where the baseline is more complex (e.g., in dry years, when project operators must use their own judgement about how much water to leave in storage north of the Delta and how much to delivery), the retrospective analysis may be more complex because it requires coming to agreement on how the projects would have been operated. For example:

- o If the Ops Group wished to reduce export pumping in the spring of a dry year to protect fish, the exporters would gain credits to the degree that they reduced pumping below what they would otherwise have pumped. But what would they have otherwise pumped? Operators would have an incentive to inflate prospective pumping predictions while environmentalists would have an incentive to underestimate predicted pumping.
- o Uncertainty about how delta export rights should be distributed between the state and federal projects could make computation of the baseline difficult and undermine trust.
- o The workshow participants should consider whether other circumstances exist in which the computation of baseline operations would be complex.

Given trust, estimating the baseline may not be a huge problem.

If computation of the baseline is a problem, then the best solution would be to develop a "perturbation" or "reoperation" model. A pertubation model starts from actual historical operations (in this case, the operations including reduced or increased exports would be the basis), then posits what would would have happened if the historical record had been perturbed in some way (e.g., what would have happened if the Ops Group had not changed exports). In this way, credits and debits can be followed retrospectively, or even on a daily basis.

Because a perturbation model must recreate how operators would have acted in a hypothetical situation, it must somehow utilize information on how operators would act in various situations. That is, it must take the same information available to operators each day (initial conditions, projections of the future, contractual requirements) and make operational decisions. This requires a fairly detailed set of operational rules. As far as I know, no such rules exist. Rather, operators use their best judgement based upon their experience.

IN WHAT CIRCUMSTANCES (AND HOW OFTEN) WILL ACCOUNTING BE STRAIGHTFORWARD? COMPLEX/ AMBIGUOUS?

In many cases, no model will be needed to calculate payback. This is because there is limited south of Delta storage:

- o Credits owed by the environment to the exporters and vice versa will generally be extinquished whenever south of Delta storage fills up.
- o When the exporters are constrained by regulations, not their own limited supplies, the amount of pumping foregone by the exporters (i.e., the credit accumulated by the exporters) should be easy to calculate, assuming that in the base case, exporters will pump whatever is allowed under regulations

WHAT ANALYTICAL TOOL(S) IS NEEDED FOR PROSPECTIVE ANALYSIS? HOW DOES THIS COMPARE WITH EXISTING CAPABILITIES?

The specifications for the analytical tools needed for prospective analysis have already been discussed.

Both DWR and USBR have forecasting models which already generate much of the needed information. In both cases, the models could easily incorporate:

- o Rules about project operations (contracts, rule curves, flood control rules, environmental standards, etc.)
- o The proposed change in operational rules (e.g., changed exports). The proposed change could involve just the current proposal for changed pumping, or could also include future changes in pumping designed to provide payback.
- o Initial conditions.

Where they appear to be weak is in the use of statistical projections about runoff, demand, etc., to present a realistic picture of the risks involved in changed export operations. The workshop should discuss the availability of data to support this kind of statistical analysis and the difficulties involved in changing the forecasting models.

WHAT ANALYTICAL TOOL(S) IS NEEDED FOR RETROSPECTIVE ANALYSIS? HOW DOES THIS COMPARE WITH EXISTING CAPABILITIES?

The specifications for the analytical tools needed for prospective analysis have already been discussed. To the extent that a perturbation model is needed, additional work would be needed to create an "expert system" which accurately modelled operator behavior.

WHAT SHOULD BE DONE IMMEDIATELY TO PREPARE FOR OPERATIONS GROUP ACTIONS WITHIN THE NEXT FEW MONTHS?

Based upon the preceding discussion, the tools available for prospective and restrospective accounting of Ops Group flexibility already exist in a rough form. Risks can already be evaluated, at least in a qualitative way. Debits and credits can be calculated after the fact, given that the members of the Ops Group can come to agreement on what baseline operations would have been in the absence of Ops Group Action. Such agreement may not be difficult to achieve on a trial basis, particularly if next year is reasonably wet.

3:15 (If time). Are the fundamental rules governing the use of operational flexibility set down by the SWRCB adequate to allow for the frequent use of flexibility?

3:45 Next Steps/ assignments